

Propeller Hat

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Abstract

The purpose of this project is to create a motorized, remote controlled, and battery powered propeller hat.

This project will require electrical engineering, programming, CAD, soldering, and immense amounts of research to create a device that is fun for all ages. All eyes in the room will immediately be on you when you enter with this miracle of aviation on your head.

Project Details

My motivation for making this project is that I enjoy making people laugh. If for even a moment, I can get them to forget about whatever they might have going on in their life and just laugh, it is worth it. In my mind, this hat is going to be a great way to get your friends laughing at a get-together, or just a fun gift to give to a child.

This hat will have a motorized propeller. It will be built in such a way that it is not obvious that the propeller is motorized until the user turns it on.

Instead of it just being one speed, which is what would happen if the motor was just wired directly to the battery, it will have a processor and a motor board which will allow for a very fine adjustment of speed, plus it gives the option to have preprogrammed tricks and perhaps upgraded features in future revisions.

The main reason for implementing it this way is that I find it more fun to just have it spin slowly than at full speed all of the time. The processor will have a Bluetooth module which will allow the hat to be controlled remotely via an app on your phone.

I am going to use CAD software like Fusion 360 to design most of the 3D printed materials and I will use Arduino hardware and software to program the controls. I will also use Cinema 4D for other parts of the project.

I will also be creating my own PCB to hold my components to limit the amount of wires needed to construct this project.

The project will be good enough when the hat can be controlled at all without needing to plug it in and upload code to it. It will be done when the main functions can be controlled remotely and easily using the app.

Background

I have never worked with an Arduino board or a Raspberry Pi. I am a novice with CAD and Cinema 4D, which I will have to get good with if I want to make a product that looks good and not just a ball of wire that will get me arrested if I try to go through the airport with it. On the topic of wires, I have never soldered any wires before so I will have to learn how to do that too. Essentially, I will have to teach myself engineering and design for this project to even be presentable, regardless of whatever code I will also have to learn how to write.

Literature Review

I started off by researching the core components I am going to need for this project, those being the processor and the motor board. I spent a lot of time on forums and Reddit, learning about which components people have had success with. Naively, I thought that I could just google “smallest processor” and “smallest motor board” and it would magically work. I was wrong. Often I would find that people were having problems with components, whether they couldn’t connect to them through Bluetooth, or Arduino IDE just simply wouldn’t work with them when it said it was supported.

I’ve also spent a lot of time watching YouTube videos and reading articles. I’ve never made a circuit in my life, apart from those snap kits I had as a kid, so I had to learn what all the pins on all of these Arduino boards are for if I didn’t want magic smoke. There is an abundance of CAD tutorials on YouTube and they have been incredibly helpful in my design process for the enclosure that will contain my parts and the PCB that I am designing with CircuitWorks. Interestingly enough, I have been learning Cinema4D (Maxon provides a very cheap license for students) so I can create a captivating video for my presentation and a lot of the concepts are similar to traditional CAD software like Fusion360 or Solidworks, but the videos are usually put together much better, which has greatly improved the efficiency with which I can realize this project.

Obstacles

As I am learning how to solder, and working on the prototype, I have discovered that it is very hard to connect as many wires as I have had to, in such a confined space as they will have to be in, by hand. This led me to explore creating a PCB that I would have manufactured by a company such as JLCPCB. This is of course, a much more refined and better looking solution than soldering a ball of wires together, but now I have to learn how to design a PCB, and it introduces new and expensive obstacles, such as, what if there is a mistake in the design? I can't just rewire it. I now have to redesign and have it manufactured again, which apart from costing money, takes time that I have little to spare.

Another obstacle is accidentally shorting a lithium battery, which I definitely didn't do.

Milestones

- v1 of enclosure design finished and 3D printed.
- Working-ish prototype done, using cheaper and not final parts (useful to discover obstacles early).
- script for video started.

Changelog

- “I will also be creating my own PCB to hold my components to limit the amount of wires needed to construct this project.” - added to project details
- added Literature Review section
- added Obstacles section
- added Milestones section